Multi-scale chemical forecasting and assimilation studies in support of AURA Validation and Science during INTEX-NA

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We will provide forecasts of global chemical composition (constrained with near-real-time satellite measurements) and real-time O_3 measurements from the U.S. EPA national network to the INTEX-NA science team during the 2006 phase of the INTEX-NA mission. The forecasts will utilize the NASA LaRC/UW-Madison Regional Air Quality Modeling System (RAQMS) to support of Aura validation and science objectives during the Intercontinental Chemical Transport Experiment – North America (INTEX-NA). In addition to flight planning support for the 2006 INTEX-NA mission, we will contribute to Aura validation by using non-coincidental (chemical data assimilation) techniques.

The science objectives of the RAQMS simulations will be to: 1) Assess the impact of long-range transport of pollutants (from Asian emissions and North American wild fire sources) on chemical composition within the US continental boundary layer, 2) Evaluate the role of STE in modification of these pollutants during transport in the upper troposphere, and 3) Assess the impact of convective venting and synoptic scale lifting of pollutants on transport of pollutants from the US continental boundary layer into the global free troposphere. As part of these studies, we have adapted existing algorithms to generate daily near-real-time North American wild fire chemical and aerosol emission inventory for the INTEX-NA using the MODIS active fire detection measurements. During the mission, RAQMS global chemical assimilation studies will be conducted using NRT satellite measurements of total column ozone (OMI or AIRS). Post mission analyses will also include available solar occultation and SAGE III limb scattering data. AURA validation efforts will focus on OMI/MLS tropospheric ozone products, and TES tropospheric retrievals.

References:

Pierce, R. B. et al., Regional Air Quality Modeling System (RAQMS) predictions of the tropospheric ozone budget over east Asia, J. Geophys. Res. 108, 8825, doi:10.1029/2002JD003176, 2003.